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AUTHOR Roe, Joy M.; And Others
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ABSTRACT

This study investigated whether the interactions of biological mothers and their offspring differ from those of institutional caregivers and infants in their charge. The subjects--43 three-month full-time Greek infants (22 home-reared infants and 21 from the institution, Babies' Center Metera) were studied while interacting with their primary caregiver. In a 30-minute observation period, timed observations 10 seconds in duration were made of infant behaviors, socializer behaviors, and mutual interactions. Findings showed that biological mothers rocked and touched their infants and vocalized in a face-to-face fashion significantly more than did caregivers. In contrast, caregivers provided more vocalization without establishing eye contact. Finally, institutional infants vocalized and fussed significantly less than home infants. Findings indicated that the rearing conditions in the two environments were different, a condition which may account for the frequently reported developmental delay of infants reared in institutions. (Author/RH)

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INTERACTIONS WITH THREE-MONTH-OLD INFANTS: A COMPARISON BETWEEN GREEK MOTHERS AND INSTITUTIONAL CAREGIVERS

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Joy M. Roe and S. Shirley Feldman
Stanford University

Antonia Drivas
Babies' Center Metera, Athens, Greece

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ABSTRACT

This study investigates whether the interactions of biological mothers and their offspring differ from those of institutional caregivers and infants in their charge. Twenty-two home infants and 21 institutional infants at 3 months of age were studied while interacting with their primary caregiver. In a 30 minute observation period, 10 sec. timed-observations were made of infant behaviors, socializer behaviors and mutual interactions. Results showed that biological mothers rocked and touched their infants and vocalized in a face-to-face fashion significantly more than did caregivers. In contrast, caregivers provided more vocalization without establishing eye contact. Finally, institutional infants vocalized and fussed significantly less than home infants. The results show that the rearing conditions in the two environments are different and this may be responsible for the frequently reported developmental delay of institutional infants.

Interactions with three-month Old Infants: A Comparison between Greek Mothers and Institutional Caregivers

Infants raised in institutions have traditionally shown developmental delays. These delays have been attributed to lower levels of both social and non-social stimulation (Casler, 1961). Bolwby's 1951 WHO report focused attention on the adverse effects of early deprivation on infant development. This awareness resulted in the closure of orphanages in the United States and many other Western countries. In those countries where infant institutions still exist, great efforts have been made to improve the quality of care for the infants, with varying degrees of success.

One such "model" institution is the Babies' Center Metera located in the suburbs of Athens, Greece. This institution attempts to provide for its infants a home-like atmosphere and the maternal love and care that home-reared infants receive. Metera is a great change from the (now closed) Greek municipal orphanages, which had a 10:1 infant to caregiver ratio. On the average, Metera has a 4:1 infant to caregiver ratio. However, the adult to child ratio varies with the time of day and by activity. For example, during nap and sleep hours the ratio of infant to caregiver is much higher, and during feeding time, the ratio is usually 2:1. The Metera caregivers work in 6-8 hour shifts and the same staff are assigned to one pavilion in order to provide stability of care and the opportunity for infants to get to know and establish relationships with the same caregivers.

To ensure that the personnel are well-trained, Metera has a 3-year

educational program for infant caregivers. Thirty-five graduate caregivers are responsible for the 100 infants that Metera houses. There are also 70 trainees at the institution who assist the main caregivers with the infants.

Most of the infants, who come from unwed working class mothers, are taken to Metera as soon as the mothers leave the hospital. When the babies arrive at Metera, they are kept under observation in isolation rooms for two weeks to make sure they do not have any contagious diseases. After the two weeks, the healthy babies are assigned to one of eight pavilions. These rooms are colorfully painted, large and airy, and all face peaceful gardens. One half of the pavilion is divided into three portions, each containing four cribs. The other half of the room consists of an open space supplied with mobiles and plenty of play material. The infants stay at Metera until they are at least three months of age, after which they are available for adoption. A few of the biological mothers, however, are reluctant to give up their babies. These indecisions and other legal matters may keep the infants at Metera until an older age.

In spite of all the improvements and efforts at Metera to provide optimal rearing experiences for the infants, Metera babies still lag behind in their development when compared to home infants in Greece. A study by Karagellis (1959) found that Metera infants had lower scores on the Illingworth (a test of infant sensory and motor development) than home-reared infants. Similarly, Paraskevopoulos and Hunt (1971) compared the infants at the Municipal orphanages with Metera infants and with babies from lower class homes in Greece. They found that the infants were most developmentally delayed at the Municipal orphanages. In particular, they found that Metera infants were slower than home-reared infants at reaching developmental stages in vocal

imitation, object permanance and gesture imitation. Panopoulou-Maratou et al., (1982) showed that these developmental delays were proportional to the time spent at Metera before adoption. Similarly, a recent study by Drivas and Roe (1986) has shown that the development of Metera infants, as measured by the Illingworth, lags behind that of home-reared infants as early as 3 months of age.

The findings of these studies regarding the relative developmental delay of Metera-reared infants versus home-reared infants raised the question of exactly what occurs at Metera between infants and caregivers compared to what happens between babies and mothers in Greek homes. Could the differences in development be attributed to differences in the caregiver-infant interactions in the two settings? It has been well documented that what the caregiver does with the infant affects the baby's development (Beckwith et al., 1976; Clarke-Stewart, 1973; Cohen & Beckwith, 1979; Elardo et al., 1977) Thus, a primary objective of this study is to explore whether any difference exists in caregiver-infant interactions compared to mother-infant interactions.

Procedure

The subjects were 43 three-month-old full-term Greek infants with no serious history of pre- or post-natal complications. Twenty-two of the subjects came from stable, Greek homes and 21 subjects came from the institution, Babies' Center Metera. The 12 female and 10 male, first-born, home infants were recruited from the obstetric records of a local hospital. At Metera, the subjects consisted of the first 10 girls and 11 boys who reached

three months of age during the two month study period. The socioeconomic level of the parents of the home infants were lower class with the mothers having a 12th grade education or less, while the socioeconomic level of the biological parents of the Metera infants could not be determined.

The birthweights of the infants in the two environments differed significantly. The home-reared babies were heavier than Metera babies with an average of 3327 grams and 2976 grams, respectively ($t=3.08$, 38 df, $p<.01$). In further statistical analysis, however, no significant correlation was found between weight and any of the behavioral measures of either the socializer or the infant.

The infants were observed in their natural environments by two trained female experimenters. In order to avoid being influenced by the hypothesis, one researcher saw the infants and mothers in their homes, whereas a different researcher observed the Metera infants with their primary caregiver. In addition, at Metera, the researcher who had collected the home data was used for establishing inter-observer reliabilities. To ensure that sequences of behavior were accurately recorded the same observer coded both the adult and infant behaviors.

Observations were conducted only when infants were awake, and excluded meal and bath time. The mother or caregiver in each situation was asked to go about customary tasks because the experimenter was supposedly present to observe the baby. However, the caregivers still seemed to be much more attentive towards the babies when the experimenter was present than at other times.

During a 30 minute observational period, the following single behaviors

were recorded each time they occurred in a 10-second interval: infant fusses/cries, infant vocalizes, and socializer interactions such as talking to the infant either without eye-contact or face-to-face, holding, rocking while holding (hereafter called "rocking"), touching affectionately, kissing, and offering the baby a toy. In addition two mutual behaviors were coded: eye-to-eye contact and mutual smiling. Instances when "others" (i.e. non-primary caregivers) talked to the infant were also recorded. All infant and socializer vocalizations were tape-recorded. Our choice of variables was dictated by the limited behavioral repertoire of 3-month old infants, and those caregiving behaviors that occurred with sufficient frequency to be analyzed.

From the above raw data, contingent behaviors were derived by noting when one of the below listed behaviors followed its companion behavior within the same or the immediately subsequent 10-second interval: percentage of baby vocalizations followed by the socializer's talking to the infant, percentage of baby's crying or fussing followed by the socializer's talking or picking up the infant (if the baby was already being held, providing further soothing actions by rocking or kissing the infant.)

Inter-observer reliability was calculated by Pearson correlations. Based on two observers at Metera, the reliability coeffeicients ranged from 0.74 for rocking, to 0.99 for infant vocalizing, and socializer holding the infant. The mean reliability coefficient was 0.94.

Results

in order to understand the relationships among the different caregiving and infant behaviors the thirteen measures were intercorrelated and the results for

the combined sample appear in Table 1.

Insert Table 1

There were many significant relationships between the measures, with 35 relationships out of the 78 attaining conventional levels of significance. Socializer-talking to infant while maintaining eye-contact with the infant was the best correlate of all other socializer measures. Kissing and holding the infant were also highly correlated with the other measures. The two infant variables, non-distress and distress vocalizations, were unrelated to each other and also had differrent patterns of correlations with caregiving behavior. Whereas baby non-distress vocalization correlated with mutual interactions at a distance (eye-to-eye and smile-to-smile behavior), baby crying correlated most strongly with proximal interactions (touch and hold). Overall, the magnitude of the correlations were moderate to low, with only 15 out of 78 associations exceeding $r=.40$, $p<.01$. As a result of this pattern of correlations, all the variables were maintained in subsequent analyses.

Separate correlation matrices were calculated for mothers and for caregivers at Metera. The results which appear in Table 2 showed surprising differences in patterns of intercorrelations. These were further examined by means of *t* tests between correlations using the *z* transformation.

Insert Table 2

For mothers, talking to the infant without establishing eye contact, holding the infant, and vocalizing in response to the infants' cries, were essentially unrelated to other caregiving behaviors. In contrast, for institutional personnel, these three behaviors showed signficant corrrelations with other caregiving interactions. This pattern was reversed, however, for the variable holding the infant in response to its cries. For mothers, but not institutional caregivers this variable was significantly correlated with other caregiving ministrations[1].

In order to assess whether interactions with institution-reared babies differed from those with home-reared babies, two-way Manovas followed by two-way univariate analyses of variance were carried out with child-rearing setting (institution vs home) and sex of infant as the factors. The Manovas showed that childrearing setting was the only significant effect for both infant behaviors ($F(2,38) = 5.57$, $p<.01$) and for caregiver interactions ($F(11,24) = 4.96$, $p<.001$). The results of the subsequent univariate Anovas and the means and standard deviations on which they are based[2] appear in Table 3. Since no sex differences were found, Table 3 shows only the main effect of child-rearing setting and the sex by setting interaction.

Insert Table 3

In terms of babies' behavior, we found that home babies were more responsive than were institutional infants. They vocalized more ($F(1,39) = 4.8$, $p < .05$) and fussed and cried more than did babies reared at Metera ($F(1,39) = 4.1$, $p < .05$). In

turn, the mothers and the institutional caregivers differed in their behavior to the infants. Whereas mothers engaged in more face-to-face talking to their infants than did caregivers ($F(1,39) = 8.0$, $p < .01$), the caregivers at Metera talked more frequently to their infants without eye-to-eye contact ($F(1,39) = 17.2$, $p < .001$). Thus, what distinguished the home and institutional infants is not the amount of vocalization that they were exposed to, but whether it was directly targeted to them and accompanied by eye contact on the part of the socializer.

Proximal behaviors were also used differentially by mothers and institutional personnel. Mothers rocked their infants significantly more ($F(1,39) = 8.0$, $p < .01$), and tended to touch their infants affectionately more often than did institutional caregivers ($F(1,39) = 3.5$, $p < .10$). In contrast, mothers and caregivers did not differ in the following variables: mutual eye- contact, mutual smiling, kissing and holding the infant and offering toys. Nor did any of the measures of contingent responsiveness differ between mothers and institutional personnel.

Discussion

The objective of the study was to examine whether caregivers at the Babies Center Metera treat infants differently than do biological mothers. From the various behaviors that we sampled, three behaviors were found to be significantly more frequent at home than at the institution. These behaviors were rocking the infants while holding them, touching them affectionately, and most importantly, talking to them in a face-to-face fashion.

It is important to note that our findings are probably an underestimation of the differences between mothers and institutional caregivers. First of all, caregivers knew which babies were being observed, and they seemed unusually

attentive and stimulating to those babies compared to the other babies in their charge. Second, because the observations were conducted in a relatively constrained time frame (lasting half an hour) the caregivers were more nurturant to all their babies during this time than they were at other times. It often seemed as if the caregivers perceived that they were being evaluated, even though we indicated that we were interested only in the identified baby.

Despite the enriched stimulation provided during the observation period of this study, caregivers talked without eye-contact to the infants much more than did the mothers. In general, this occurred as the caregiver sought the infant's attention while the infant was averting its gaze. Caregivers were quite persistent and frequently disregarded the infant's cues, suggesting a certain insensitivity in caregiving. It was as if the caregivers failed to recognize that gaze aversion is one of the few techniques available to three-month-old infants by which they can regulate the amount of stimulation they receive.

Other evidence from this study suggests that the caregivers may have been overstimulating the infants. According to the correlations, the caregivers, but not the mothers, tended to stimulate the infant in many different modalities. Caregivers who frequently talked to the infant without establishing eye contact were also likely to engage in frequent proximal bids of all types. They would hold, touch, rock and kiss the infant. For the caregivers (but not for the mothers) the various proximal bids were highly correlated with one another. This may indicate that caregivers, in their efforts to stimulate the child, used any and all types of stimulation, whereas mothers were more differential in the techniques that they used.

The apparent insensitivity and overstimulation by the caregivers may be due to the infrequent opportunities that they have to interact with each infant. Since the caregivers can only devote a limited amount of time to the child in a one- on- one interaction they try their hardest to make the child responsive, even if the infant is initially unwilling. If the baby does not respond to the early attempts to engage its attention, the caregiver escalates her efforts resulting in an indiscriminate type of stimulation. In other settings stimulation that is directed primarily by the caregiver without close match to the infants' signals has been described as interfering and insensitive and has been associated with insecure attachments in older infants (Ainsworth et al., 1971). Not surprisingly, institutional infants and other infants reared in group settings have been reported to have a high incidence of insecure attachments (Sagi et al., 1985; Tizard and Rees, 1975).

The institutional caregivers had good reason to want to stimulate the infants. Despite the fact that we coded only very few infant behaviors, Metera infants showed significantly lower frequencies of both distress and non-distress vocalizations than did home reared infants. Such differences in spontaneous vocal output so early in life are remarkable, and are reminiscent of similar findings with other institution-reared infants (Provence & Lipton, 1961; Rheingold, 1956). Although it is possible that the low rate of face-to-face vocal stimulation of the caregivers was a result of the low vocal output of the infants, we think it is unlikely, given that the caregivers differed only marginally from mothers in total verbalization to infants (i.e. with and without eye contact). We think it is more plausible that the infants had a low vocal output because the caregivers did not provide them with

extensive opportunities to engage in reciprocal face-to-face vocal interactions. That is, differences between mothers and caregivers may be responsible for the differences in the infants' vocal imitation and language development, areas where institution-reared children repeatedly show particular deficiencies (Paraskevopoulos & Hunt, 1971; Panopoulou-Maratou, et.al. 1982). Our speculation is in line both with empirical findings and with the theorizing of other researchers, that face-to-face vocal exchanges between infant and caregiver are crucial for the emergence of the child's linguistic and cognitive competence (Brazelton et al., 1974; Lewis & Freedle, 1973; Papousek & Papousek, 1975; Rheingold, 1956; Roe et al.,1982; Schaffer, 1979). When the socializer establishes eye contact while talking to the infant, she gives the infant the opportunity to engage in a dialogue-type interaction where the infant learns to take turns, to focus its attention for increasingly longer time intervals and in general to develop certain cognitive skills that are indispensible for subsequent language and intellectual development.

In sum, our findings are consistent with other studies of institutional infants in showing deficits in infants' vocalization. In addition, we were able to identify language related differences between mothers and institutional caregivers that may relate to infant performance. Since the data we obtained is correlational, we present our interpretations with caution. It is possible that institutional-home differences in the infants behavior is related more to other factors than to those we have identified. For example, the institutional infant but not the home baby was exposed to an early stay in isolation, frequent rotation of caregivers, and a 3:1 infant/ personnel ratio. Further, it

is possible that unmeasured socializer variations and even biological factors due to genetic factors or to prenatal care may well contribute to infant differences. Despite these cautions, we have identified important socializer differences between home-mothers and institutional caregivers that have potential importance for the development of children.

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Footnotes

1. There were stronger correlations for Metera caregivers than for mothers between (a) talking to the infant without eye-contact and the percentage of time spent talking to the crying infant ($t=2.23$, $p<.05$), kissing ($t=2.5$, $p<.05$), and touching the infant ($t=1.86$, $p<.10$); (b) between holding the infant and touching ($t=2.8$, $p<.01$), kissing ($t=2.5$, $p<.05$), and eye-to eye contact ($t=2.03$, $p<.05$); and (c) between the percentage of time adults talked to the infants in response to their cries and talking with no eye contact ($t=2.23$, $p<.05$). In contrast, mothers showed stronger correlations than caregivers between the percentage of time they held the babies in response to their cries and touching the infant ($t=2.48$, $p<.05$), eye-to-eye contact ($t=2.05$, $p<.05$), and smile-to-smile sequences ($t=2.10$, $p<.05$).

2. Because there was a correlation between the means and the variances for certain variables we also carried out transformations on the data using (a) square roots, and (b) logarithms and repeated the Manovas and Anovas. In both cases the results were identical - there were no changes in the variables that were significant/non significiant. Given the convergence in results between transformed and untransformed data we present the untransformed data in the table and in the analyses for they give a better intuitive feel for the findings.

Table 1. Correlations between infant and caregiver behaviors for the combined sample of socializers.

	Infant		Socializer						Mutual		Sequential		
	Vocalizes	Cries	Talks, eye contact	Talks, no eye contact	Holds	Touches	Rocks	Kisses	Eye-to-eye	Smile-to-smile	% talks to infant vocalize	% talks to infant cries	% holds to infant cries
Infant vocalizes		-	.22^{+}	-.35**	-.31*	.22^{+}	-	.21^{+}	.31*	.39**	-.24^{+}	-	-
Infant cries			-	-	.26*	.25*	.41**	-	-	-.24^{+}	.27*	-	-.24^{+}
Talks, eye contact				-.20^{+}	.23^{+}	.45***	.27*	.42**	.49***	.55***	.52***	.35*	-
Talks, no eye contact					.29*	-	ns	-	-	-	-	.35*	-
Holds						-	.44*	.46***	-	-	.44**	.23^{+}	-.27*
Touches							-	.36**	.52***	.25*	.23^{+}	-	-
Rocks								-	ns	ns	-	-	-
Kisses									.40**	.36**	.22^{+}	-	-
Eye-to-eye										.74***	.27*	-	-
Smile-to-smile											.27*	-	-
% talks in response to infant vocalize												-	-
% talks in response to infant cry													.38*
% holds in response to infant cry													

$^{+}p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$

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Table 2. Correlations between infant and caregiver behaviors for home mothers (above the diagonal) and institution caregivers (below the diagonal).

	Infant		Socializer						Mutual		Sequential		
	Vocalizes	Cries	Talks, eye contact	Talks, no eye contact	Holds	Touches	Rocks	Kisses	Eye-to-eye	Smile-to-smile	% talks to infant vocalize	% talks to infant cries	% holds to infant cries
Infant vocalizes		-	-	-	-	-	-	-	-	.41*	-	-	.36*
Infant cries	-		-	-	.41*	-	.37*	-	-	-.36*	.36*	-	-
Talks, eye contact	-	-		-	-	.40*	-	.48**	.48**	.49**	.57**	.41*	.38*
Talks, no eye contact	-.39*	-	-		-	-	-	-.36*	-	-	-	-	-
Holds	-	-	.38*	.40*		-	.67***	-	-	-	-	-	-
Touches	-	-	-	.44*	.59***		-	-	.51**	-	.35*	-	.56***
Rocks	-	-	-	-	.55**	.58**		-	-	-	-	-	-
Kisses	-	-	-	.41*	.82***	.57***	.67***		-	.37*	-	-	.45*
Eye-to-eye	-	-	.58**	-	.39*	.56**	.51**	.57***		.80***	-	-	.53**
Smile-to-smile	-	-	.68***	-	-	-	-	-	.65***		-	-	.60**
% talks in response to infant vocalize	-	-	.70***	-	.61***	-	-	.37+	-	.48*		-	-
% talks in response to infant cry	-.49*	-	.46*	.57**	.40*	.38*	-	-	-	-	-	-	-
% holds in response to infant cry	-	-.36*	-	-	-	-.45*	-.31+	-	-	-	-	-	

+p < .10, *p < .05, **p < .01, ***p < .001

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Table 3. Means, standard deviations and results of setting x sex of child[a] Anovas.

	Home		Institution		$F_{(1,39)}$	$F_{(1,39)}$
	$\bar{X}$	SD	$\bar{X}$	SD	Setting	Interaction
Infant behavior						
Vocalizes	29.6	22.2	17.5	14.1	4.8*	ns
Cries	30.0	30.8	15.0	13.8	4.1*	ns
Socializer behavior						
Talks to infant, eye contact	95.2	37.1	66.0	29.4	8.0**	ns
Talks to infant, no eye contact	6.5	7.1	24.1	18.0	17.2***	ns
Holds	51.0	37.5	67.0	33.9	ns	3.1+
Rocks	12.1	15.0	2.9	4.3	8.0**	ns
Touches	43.4	20.8	32.8	14.6	3.5+	ns
Kisses	6.7	8.4	5.4	5.9	ns	ns
Mutual behavior						
Eye-to-eye	80.2	38.6	76.3	33.2	ns	ns
Smile-to-smile	36.4	32.1	28.9	19.4	ns	ns
Sequential behavior						
% talks in response to infant vocalize	57.9	20.6	54.4	20.5	ns	ns
% talks in response to infant cries	46.5	20.8	46.9	16.2	ns	ns
% holds in response to infant cries	13.6	11.5	10.3	10.7	ns	ns

[a] Sex of child was not significant in any Anova

+$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$.